

IMPROVING INSTRUCTOR RESPONSE TO STUDENT E-MAILS USING TEMPLATE AND REMINDER INTERVENTIONS

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ABSTRACT

Student e-mails without the student's name, message, file attachment, and other identifying information may impede a timely and thorough instructor response. To help resolve this issue, we apply template and reminder interventions to improve student e-mail format defined as the degree of agreement between a student's e-mail format and an instructor provided template. A pilot study (Study 1) employing a sample of 36 online undergraduate marketing students concluded that instructor supplied e-mail format template significantly improved student e-mail format. Additional refinements were examined in Study 2 to test three instruction formats (verbal, separated graphic and verbal, and integrated graphic and verbal) and two levels of instruction reminders (once and three times) using a sample of 78 online undergraduate marketing students. Results show that integrated graphic and verbal instructions, and independently, reminder announcements improve student e-mail format. Results from the two studies are discussed in terms of pedagogical benefits for the marketing educator.

KEYWORDS

E-mail template; e-mail design; reminders; factorial design; cognitive load theory

I. INTRODUCTION

E-mail has evolved as a central component of the college students' academic life [1,2] having been used in a variety of instructional contexts such as mentoring, collaboration, counseling and cognitive development [3]. Given students report greatest use of e-mail to communicate with instructors [4,5], students often expect an instant response [6,7] that is often compromised due to the casualness of students' email [7]. Over one-quarter of recipients of e-mails misunderstood the communication [8] that increase the cognitive effort required to identify relevant and authentic e-mails [9] and may create an e-mail backlog leading to heightened instructor stress [10]. Though barriers to effective e-mail communication include weaknesses in student and instructor language efficiency, a first step to mitigate e-mail ineffectiveness as has been advocated by various scholars is to address e-mail format [11,12,13], though scant guidance has emerged regarding e-mail format. The absence of studies examining the benefit of e-mail format on student-instructor e-mail correspondence is the motivation for this study.

Occasionally, student e-mails contain errors of format omission (student forgetting to include format elements such as their name, a message, course code, etc) forcing instructors to search for the missing student e-mail format elements to establish the intent and origin of the student's e-mail that may impede an orderly communication process. Student e-mails formatted according to an instructor supplied template together with reminder announcements may help expedite a timely and thorough instructor response whose primary pedagogical benefits improve communication and prompt feedback to assist with learning.

The assumption that e-mail format will allow for a prompt and helpful instructor response to a student's e-mail sets the stage for this study whose purpose is to experimentally demonstrate how complex-skill-behaviors (e-mail format) may be taught with templates and reminder techniques. To explore these interventions on student e-mail format, a pilot study (Study 1) examined whether an e-mail format template helps improve student e-mail format. A second study (Study 2) compared three different e-mail format templates and two reminder levels on student e-mail format.

A. Benefits of instructor-student e-mails

Most online students prefer e-mail to communicate with their instructors [14,15,16], with e-mail instructions helping direct students to comply [17,18]. Complicating matters are e-mail cues attracting judgments about the sender [19,20,21,22] leading instructors to decide if and when they will read the e-mail, and whether to respond [23].

E-mail content relates to information richness theory [24] suggesting that more detailed information reduces user uncertainty and is likely to be acted on [25]. Further, there is a positive relationship between explanation of e-mail policy to users and resulting user behavior [26]. The positive influence of e-mail communication and likelihood of student action from detailed instructions leads to the first hypothesis:

H₁: A verbal template requiring student e-mails to contain format elements will be more effective than no e-mail format template.

B. Developing e-mail format templates using Cognitive Load Theory

Cognitive load theory posits that learners use their limited working memory efficiently when learning a difficult task [28] and has been used successfully to enhance learning of complex learning materials [29,30,31,32]. Sweller's [33] seminal work on cognitive load theory describes how learning materials such as graphics, text, auditory and visual cues may be presented to help learners apply available cognitive resources in learning. For example, Chandler and Sweller [34] discovered that students learn more effectively when text and diagrams are presented together (integrated format) due to a decrease in cognitive load typically used to combine text and diagrams into a coherent whole. If text and diagrams are offered separately (separated format), a learner's attention is split in two, going back and forth to understand the material, impeding effective learning and is referred to as a "split-attention" effect [35]. This study continues the development of work on cognitive load but with a pointed difference, the application of cognitive load theory to a set of brief and straightforward instructions.

Cognitive load theory was used to create two additional e-mail format instructions referred to as to the separated graphic and verbal format and the integrated graphic and verbal format such that more detailed instructions will reduce uncertainty and are likely to be acted on [25]. We therefore hypothesize the following:

H₂: According to cognitive load theory, an integrated graphic and verbal instruction will be more effective than either a verbal, or a separated graphic and verbal instruction.

C. E-mail format reminders

Though repeated instructor initiated e-mail messages have not translated into higher levels of participation in class discussion [36], Cowan [37] discovered that participants' recall is increased with

repeated semantic processing of words regardless of conditions, and Borges [38] suggests that multiple-repetition instructions contribute to a subjects' increased recall performance. On the basis of this discussion, we hypothesize the following:

H₃. Announcing e-mail format instructions once before each due assignment will produce higher scored student e-mail format than a one-time announcement.

Finally, we are interested in the interactions between instruction format and announcement frequency reflected in the fourth hypothesis:

H₄: Integrated graphic and verbal instructions announced multiple times will be more effective than any other combination of format instruction and announcement frequency.

II. METHOD

The empirical component of this paper is presented as two studies. Study 1 was a pilot study examining whether a verbal e-mail format template improve the format of student e-mails. Study 2 advances the findings by formally testing the effect of three instruction formats (verbal, separated graphic and verbal, and integrated graphic and verbal) and two levels of reminder frequency (once early in the course versus once before each student assignment) on student e-mail format. The following sections describe elements common to both studies.

D. Research Setting

For both studies, participants were online undergraduate business students enrolled in three 300 level online Principles of Marketing sections using Blackboard as the course management system. In line with work by Babel et al [39], we selected 300 level course students as they are more likely to take evaluations seriously and respond more faithfully than their lower level classmates.

E. Defining the dependent variable of e-mail format

An exploratory study examined a sample of 250 e-mails from online business students using traditional exploratory content analysis guidelines [40] to analyze e-mail content using no preexisting categories. The results operationalize the dependent variable student e-mail format as the sum of five format elements present in the e-mail that are; course code, course section, salutation, message and student's name. The highest score is a five (all elements present), and the lowest score a zero (no elements present).

F. The online student as a moderating variable

The significant associations with online student achievement are age [41], gender [42] and GPA [43] such for online courses, older female students with high GPAs perform better than their peers. We did not control for the influence of age as a result of a conversation with the head of the Institutional Research Unit who provided data showing the mean online undergraduate student age was between the early to mid thirties. To improve the generalizability of the findings by focusing on the effect of the treatment [44], both gender and GPA were controlled by matching participant GPA and gender in the assignment of students to experimental groups.

G. Assigning students to a treatment group

Pairs of students were formed on identical gender (self-reported) and similar (± 0.05) GPA (university records). One member of each student pair (same gender, similar GPA) was randomly assigned to one of the groups based on the flip of a coin. To control for instrumentation, we used a double-blind procedure where the researcher coding the results did not know which group a student belonged to. To control for interactions among students threatening external validity, an e-mail notified students of an assignment's due date and not to submit their assignment until they received a second e-mail containing the e-mail format template according to their experimental group membership. For both studies, the Blackboard *group* utility was used to place each student in their assigned experimental group, allowing the authors to send each group the appropriate e-mail format template. In line with Institutional Review Board requirements, participants were notified and permission solicited to use their results once the studies had ended. This approach avoids rewarding or penalizing students such that the reward or penalty for student participation may improve email format as a result of such controlled behavior [45].

III. STUDY 1

A. Design

To test whether an e-mail format template would improve student e-mail format, we used an after-only with control design using two equally populated groups of students. The control group was e-mailed a request to submit their assignment by e-mail; the treatment group was e-mailed the same request, together with verbal instructions template to format their e-mail (see Figure 1, Panel A).

Figure 1. E-mail Instruction Treatment (Panel A)

Panel A: Verbal Instruction Announcement

"E-mail your end-of-chapter participation work using the following instructions; Send your e-mail from your University e-mail account (at <https://mail.xxx.edu/>) to me at XXX@xxx.edu. Include your Course Code & Section (e.g., MKT 3361, Section XTIA or XTIB) in the Subject Line, a Greeting and the Chapter number (1, 2 or 3), Question Number, the Question, your Answer and your Full Name in the message box.

B. Measurement and data collection

Students were given two assignments three weeks apart, each requiring an answer to a textbook chapter question submitted to the instructor in the body of the e-mail. Each student's e-mail format (dependent variable) was scored by counting the number of e-mail format elements present out of a maximum five format elements of course code, course section, salutation, message and student's name.

C. Participants

Thirty-six participating students from one online Principles of Marketing course were equally divided into two groups, one as the control, and the other as the treatment group. Over 88% of the participants reside in the same geographic region of the university, a finding consistent with other studies [46,47]. The median age is 32.5 years (M=33, SD=7.99), consistent with prior work [48,49], the majority are female (66%), taking a full course load (89%), employed full-time (89%), a mean GPA of 3.25, with most preferring online courses (61%).

D. Results

Table 1 reports significant and positive t-test results, $t(34) = 7.00$, $p < .01$, observed power =0.99, supporting H_1 , that a verbal e-mail format template (Figure 1, Panel A) generates a significantly higher mean e-mail format score ($M=4.61$, $SD=.61$) versus no e-mail format template ($M=2.80$, $SD=.91$) resulting in a mean difference of 1.81 between the two groups.

Table 1. Influence of verbal e-mail format instructions on student e-mail format (n=36)

Groups	GPA		Gender mix		E-mail format score		n	df	t-statistic	p
	M	SD	Female	Male	M	SD				
Treatment*	3.25	.50	12	6	4.61	.61	18	34	7.00	<.01
Control	3.26	.49	12	6	2.80	.91	18			

* Treatment group received e-mail format instructions e-mailed to students 24 hours before the first assignment's deadline. Control group received no e-mail format instructions.

IV. STUDY 2

The significant and positive Study 1 results encouraged a more formal examination about treatments to improve student e-mail format as investigated in Study 2.

A. Refining the dependent variable e-mail format

To deepen the measurement of student e-mail format, we added five additional student e-mail format elements for a total of ten format elements of: the course code, course section, salutation, message, student's name, e-mail sent from student's university e-mail account, assignment sent to the professor's e-mail account, and includes the assignment's chapter number, questions number, and question. These ten e-mail format elements make up the dependent variable e-mail format for Study 2.

B. Design

We used a 2 (*one-time* application of the e-mail format instruction sent 24 hours before the first assignment's deadline; *multiple* e-mail format instruction announcements, sent ahead of each of the three student assignments) x 3 (three format instruction template levels shown in Figure 1, Panels A, B and C) factorial design.

Figure 1. E-mail Instruction Treatments (Panels B and C)**Panel B: Separated Graphic and Verbal Instruction Announcement**

"E-mail your end-of-chapter participation work using the following format;"

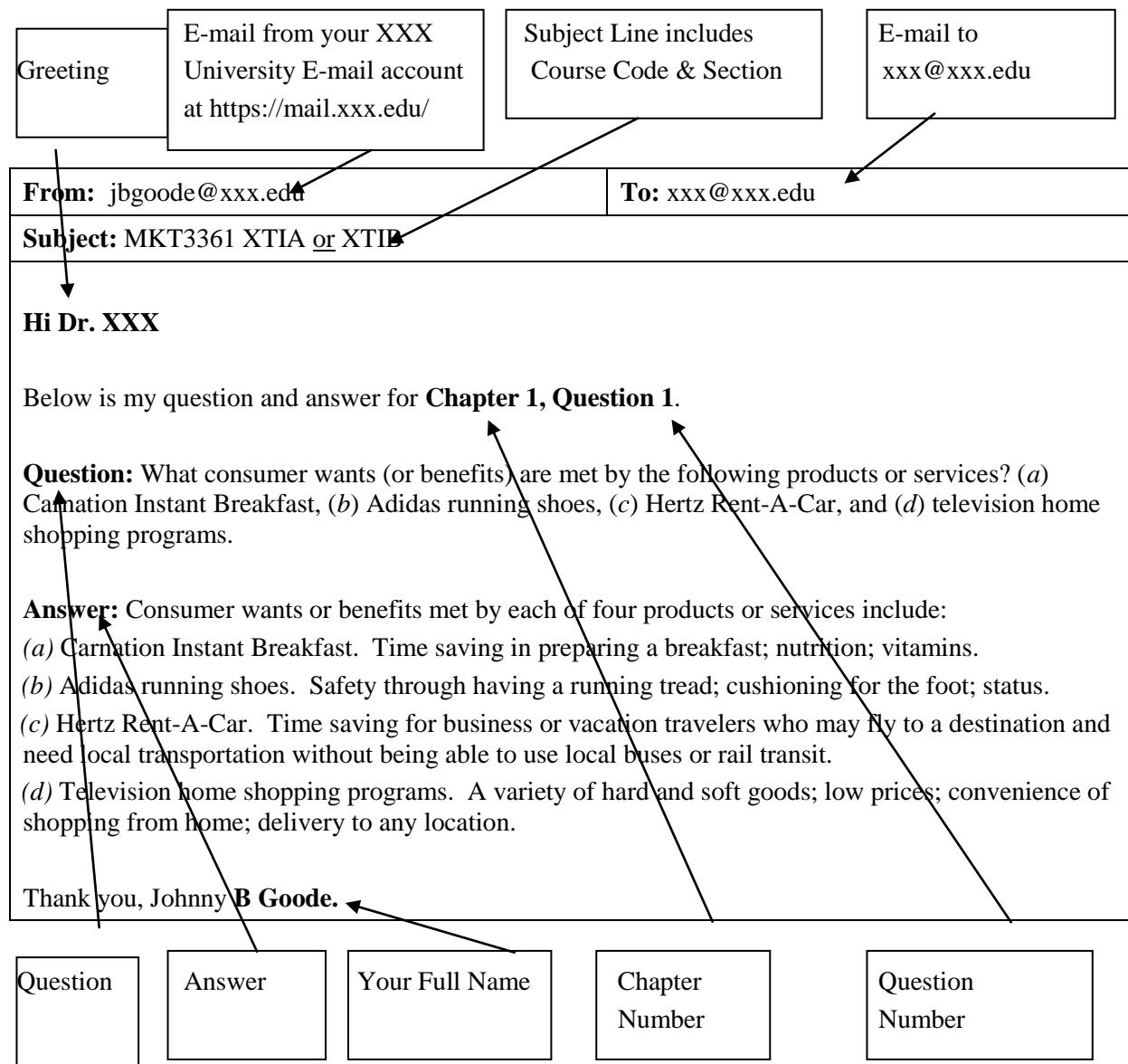
From: [1] jbgoode@xxxx.edu	To: [2] xxx@xxx.edu
Subject: [3] MKT3361 [4] XTIA or XTIB	
[5] Hi Dr. XXX	
Below is my question and answer for [6] Chapter 1, [7] Question 1.	
<p>[8] Question: What consumer wants (or benefits) are met by the following products or services? (a) Carnation Instant Breakfast, (b) Adidas running shoes, (c) Hertz Rent-A-Car, and (d) television home shopping programs.</p> <p>[9] Answer: Consumer wants or benefits met by each of four products or services include: (a) Carnation Instant Breakfast. Time saving in preparing a breakfast; nutrition; vitamins. Adidas running shoes. Safety through having a running tread; cushioning for the foot; status. Hertz Rent-A-Car. Time saving for business or vacation travelers who may fly to a destination and need local transportation without being able to use local buses or rail transit. Television home shopping programs. A variety of hard and soft goods; low prices; convenience of shopping from home; delivery to any location.</p> <p>[10] Thank you, Johnny B Goode.</p>	

Question and answer prepared by Michael J. Vessey [27].

- [1]** Send your e-mail from your XXX University e-mail account at <https://mail.xxx.edu/>
- [2]** Send your e-mail to XXX@xxx.edu
- [3]** Include the course code (e.g., MKT3361)
- [4]** Include the course section (e.g., XTIA or XTIB)
- [5]** Include a greeting to the instructor
- [6]** Include the Chapter number (1, 2 or 3)
- [7]** Include the question number
- [8]** Include your question
- [9]** Include your answer
- [10]** Sign off with your full name.

Panel C: Integrated Graphic and Verbal Instruction Announcement

"E-mail your end-of-chapter participation work using the following format;"



C. Measurement and data collection

Three assignments were given every two weeks, each requiring an answer to a textbook chapter question submitted to the instructor in the body of the e-mail. Each student e-mail format (dependent variable) was scored by counting the number of email format elements present out of a maximum ten format elements.

D. Participants

Seventy-eight students from two online Principles of Marketing course sections participated in this study. As with the Study 1 participant profile, over 86% of the participants reside in the same geographical region as the university. The median age is 32.5 years ($M=33.8$, $SD=8.75$), the majority are female (70%), taking a full course load (81%), employed full-time (81%), a mean GPA of 3.20, with most preferring online courses (61%).

Although the study began with equally populated groups, six students dropped due to a lack of financial aid resulting in an unbalanced design (a dissimilar number of participants in each experimental unit). Table 2 describes the characteristics for each experimental group.

Table 2. Assignment of students by treatments to control for GPA and gender (n=78)

Treatments		GPA		Gender mix		
E-mail Instructions (A)	Application (B)	M	SD	Female	Male	n
A_1 : Verbal	B_1 : Once	3.13	.67	8	5	13
	B_2 : Thrice	3.04	.69	9	3	12
A_2 : Separated graphic and verbal	B_1 : Once	3.28	.49	7	3	10
	B_2 : Thrice	3.13	.56	9	4	13
A_3 : Integrated graphic and verbal	B_1 : Once	3.13	.44	9	4	13
	B_2 : Thrice	3.13	.55	9	4	13

E. Results

We performed a one-way analysis of variance (ANOVA) to test for the main and interactive effects of template and repeated measures on the dependent variable student e-mail format element count across the 6 different treatment groups. Levene's Test of Equality of Error Variances confirms the equality of sample variances and hence appropriate application of ANOVA ($F(5,68) = 1.86$, $p=.11$). The means and standard deviations for each experimental group are presented in Table 3.

Table 3. Experimental group descriptive statistics

E-mail Instruction	Application	M	SD	n
Verbal (A_1)	Once (B_1)	8.74	1.13	13
	Thrice (B_2)	9.11	1.24	12
	Total	8.92	1.18	25
Separated (A_2)	Once (B_1)	8.57	.93	10
	Thrice (B_2)	9.56	.53	13
	Total	9.13	.87	23
Integrated (A_3)	Once (B_1)	9.41	1.16	13

	Thrice (B ₂)	9.77	.57	13
	Total	9.59	.92	26
Total	Once (B ₁)	8.93	1.12	36
	Thrice (B ₂)	9.49	.86	38
	Total	9.22	1.03	74

Table 4 reports a significant effect of the three format templates, ($F(2,68) = 3.32$, $p <.05$). The results in Table 5 show the Tukey HSD pairwise differences among the means identifies the most effective format ($p <.05$) as integrated instructions ($M=9.59$, $SD=0.92$) against verbal instructions ($M=8.92$, $SD=1.18$) but not with separated ($M=9.13$ $SD=0.87$) instructions. These mixed finding partially support H₂ suggesting that integrated instructions (Figure 1, Panel C) are superior to verbal instructions, but not against separated instructions.

Table 4. Analysis of Variance Table for 2 x 3 Factorial Experiment of instruction and application levels.

Variable	SS	df	MS	F	Sig.
E-mail Instruction (A)	6.21	2	3.11	3.31	.04
Application (B)	6.05	1	6.05	6.47	.01
A X B	1.57	2	.79	.84	.44
Residual	63.66	68	.94		
Total	6368.56	74			

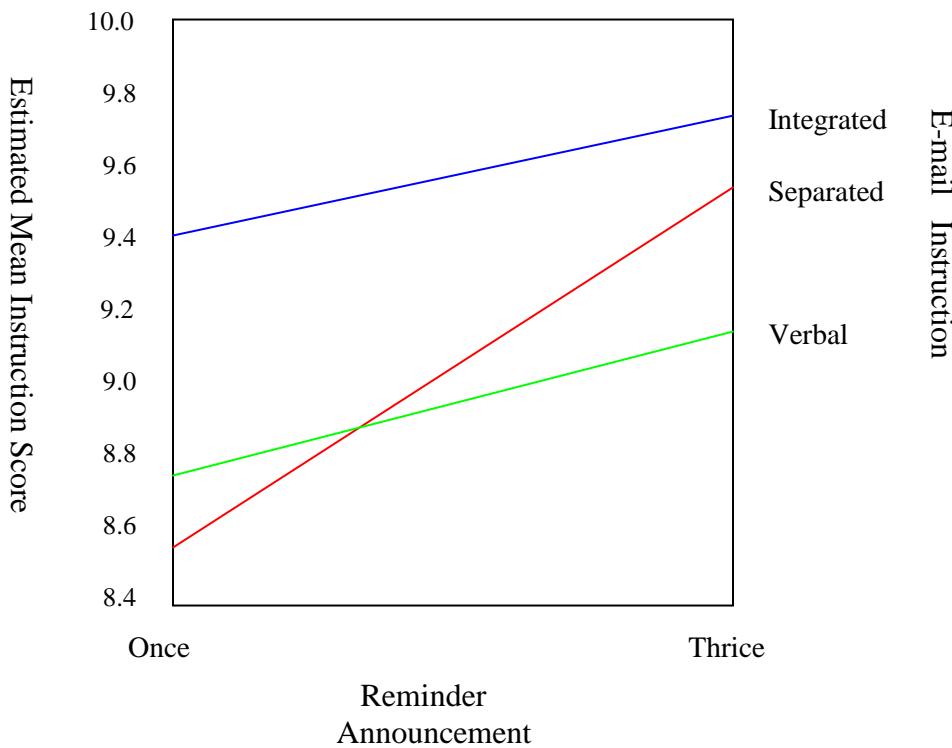
Table 5. Pairwise Comparisons of the Dependent Variable Observed Mean E-mail Format Score

			Mean Difference (A-B)	SE	<i>p</i>
	E-mail Instruction (A)	Application (B)			
Tukey HSD	Verbal (A ₁)	Separated (A ₂)	-.21	.28	.73
		Integrated (A ₃)	-.67	.27	.04
	Separated (A ₂)	Verbal (A ₁)	.21	.28	.73
		Integrated (A ₃)	-.46	.28	.23
	Integrated (A ₃)	Verbal (A ₁)	.67	.27	.04
		Separated (A ₂)	.46	.28	.23

ANOVA results in Table 4, ($F(1, 68) = 6.47$, $p = 0.01$) support H₃, that repeated e-mail format announcements sent ahead of each student assignment produces higher e-mail format scores ($M=9.49$, $SD=1.12$) compared to a one-time announcement at the start of the course ($M=8.94$, $SD=0.86$), yielding in a mean difference of 0.55 between single and multiple e-mail format announcements.

ANOVA results in Table 4 ($F(2, 68) = 0.84, p = 0.44$) do not support H_4 , that there is an advantageous combination of instruction format and announcement frequency. Overall, the results are graphically presented in Figure 2 such that the integrated format is most effective (partially supporting H_2), and independently, reminder announcements do improve e-mail format scores (supporting H_3).

Figure 2. Estimated Mean Treatment Interaction Effects



The results should be interpreted in light of two issues. First, various studies [41,42] suggest significant differences on performance between younger and older students, a factor not experimentally controlled in our studies as we accessed online students who are considerably older than their offline peers [48,49]. Second, the preponderance of female students might introduce a degree of gender bias in the results, though a pooled samples t-test ($t(72) = 0.19, p = 0.42$) shows no significant difference between the e-mail format scores of male ($M=9.19, SD=1.05$) and female ($M=9.24, SD=1.03$) participants.

V. DISCUSSION

This study offers several contributions. First, we identify the integrated verbal and graphic template as materially improving student e-mail format learning. Formalizing and implementing an e-mail format template may be particularly useful for instructors teaching multiple large sections.

Second, we demonstrate that cognitive load theory may be applied to straightforward and brief instructions reflected in the student e-mail format template used in this study. Consistent with cognitive load theory, an integrated graphic and verbal instruction is the most effective e-mail format instruction. This is because the separated graphic and verbal instruction causes unnecessary cognitive load by forcing students to switch their attention back and forth between the graphic and verbal instructions [34]. Similarly, verbal instructions without graphic information adds cognitive load for the student. We believe

the same argument holds true for verbal instructions.

Third, by providing reminder announcements; students will likely adhere to the e-mail format template since repetition reminds students of the importance of the e-mail format. The absence of significant interaction effects (e-mail format together with announcement frequency) is disappointing, though repeating instructions as a reminder prior to each assignment's deadline will result in higher scored student e-mail format and is consistent with prior work (37,38].

A. Educator and Pedagogical Implications

E-mail may effectively support and enhance the knowledge and skills of successful online learners given interpersonal and communication skills dominate the top 10 general competencies in distance education programs [50] and are couched in two of the seven principles for good practice in undergraduate education [51] that are discussed below.

1. Contact between students and faculty:

As part of a dialogical learning model, a formal e-mail format policy will likely improve the quality of interaction between students and faculty, and in turn assist students' access to new knowledge thanks to this efficient form of interaction. As suggested [52], an e-mail format policy would contribute to an online learning environment supporting dialogical learning. The importance of dialogue between student and instructor is accorded greater importance when consideration is given to the heterogeneity of online students representing a diverse set of cultural and educational backgrounds [53].

2. Prompt Feedback:

Various studies indicate that instructor-student response time is a key factor in student learning [54,55] and there is a positive relationship between explanation of e-mail policy to users and user behavior [26]. By advocating an e-mail format requirement, students compose well formatted e-mails to instructors who in turn are able to respond in a timely and thorough manner.

The pedagogical benefits of contact and prompt feedback may be fine tuned to create a unique template of e-mail format elements (student name, course code, etc) appropriate to each instructor's anticipated needs using an integrated verbal and graphic template (shown in Figure 1, Panel C).

From a broader perspective, this study advances the importance of templates and reminders as pedagogical tools to improve student and instructor communication and most importantly, student learning.

B. Suggestions for further study

A follow-on study would be to examine the relationship between student e-mail templates on student learning. The implied benefit would be to reduce the down-time associated with poorly formatted student e-mails on the work-load of instructors that reduces time for student learning.

The unexpected contribution of cognitive load theory on short instruction sets as established in this study is to test similar instruction sets on other populations such as graduate students, students in disciplines beyond business, and professionals outside of academe. Similarly, the frequency and timing of instructions should be investigated to determine optimal time intervals, the influence of competing announcements and the contribution of repeated reminder announcements using computer-mediated

communication channels beyond e-mail (discussion boards, instant messaging, chat rooms, and podcasts).

Over the past six months we have observed anecdotal improvements in student e-mail format suggesting the influence of carryover from our studies. This result encourages investigation as to whether a set of format instructions used repeatedly by one instructor might lead to similarly formatted student e-mails and their high quality emails will, in turn, benefit other instructors.

VI. CONCLUSION

This study offers insight about the *what* and *when* of e-mail format templates and reminders to improve contact and prompt feedback between students and instructors. E-mails with up to ten template elements, using an integrated graphic and verbal instruction format and frequent reminders (more is better) will result in a marked improvement in student e-mail format and reduce the instructor's response downtime. The key take away from this study is that instructor supplied templates and reminder announcements reduce unnecessary communication delays and will help facilitate student learning.

VII. ABOUT THE AUTHORS

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